This Page Is Inserted by IFW Operations and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents will not correct images, please do not report the images to the Image Problem Mailbox.

5. Drawings

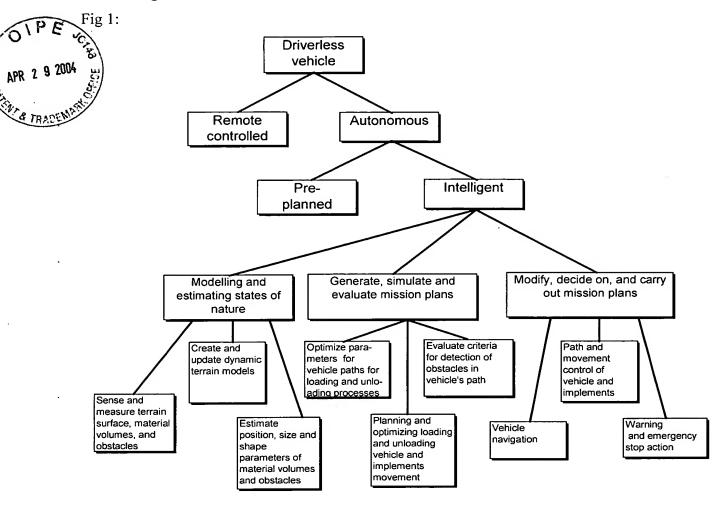


Fig 2:

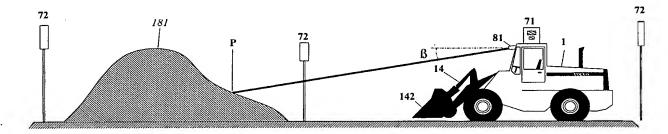


Fig 3:

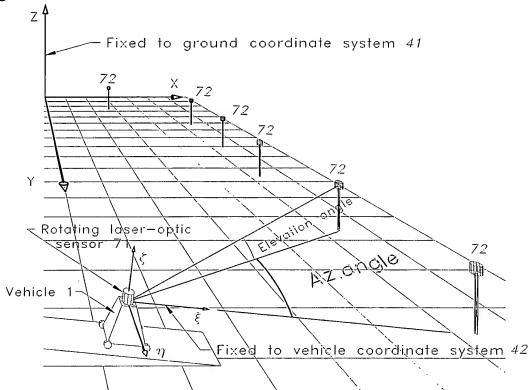


Fig 4:

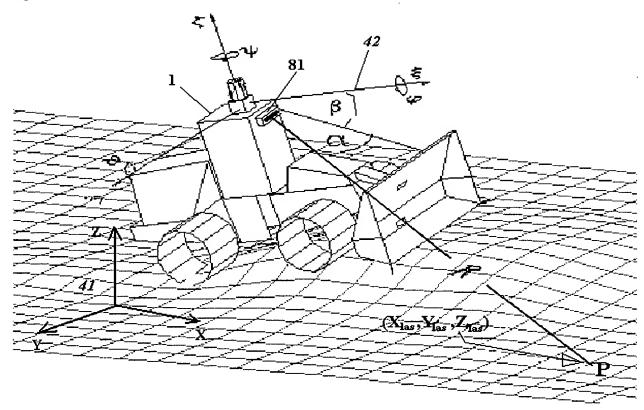


Fig 5:

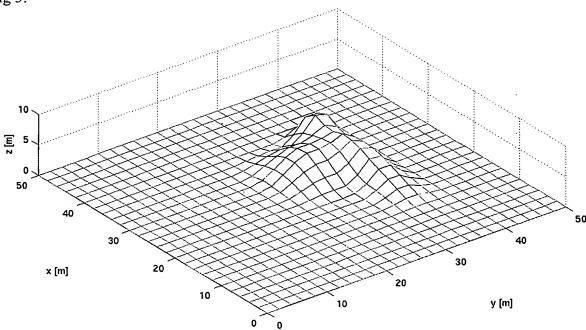


Fig 6:

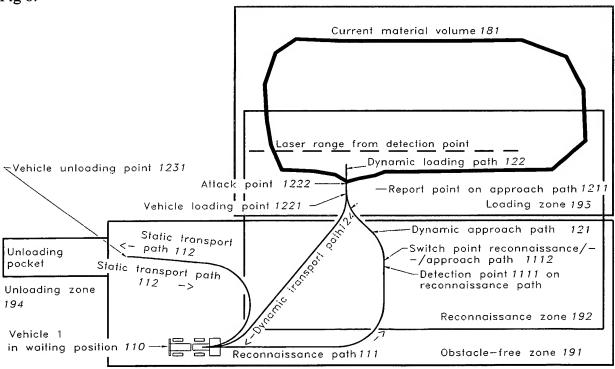


Fig 7:

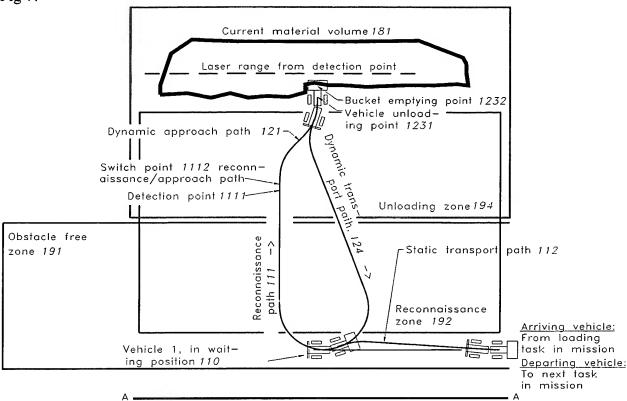


Fig 8: Radio link 5 Operator station 3 On board obstacle detection and position determination sensors Mission computer 6 Receives and handles mission instructions. Scanning laser Processes mission program, rangefinder 81 optimizes path, vehicle and implement movement parameters based on attack point 1222 coordinates and height profile z(k), DTM computer 82 for k=1,2,... as obtained from the DTM updating and maintaing the computer. Simulates, generates dynamic terrain model vehicle and implement control data DTM. Processes pro-Vehicle Operator Man/machlist 971 and transmits this data to grams for obstacle detectradio link station ine interface the vehicle control computer 211 ion and for optimizing terminal 52 radio link computer 31 coordinates of lo-Obstacle terminal 51 with support ading/unloading points and for mission detection Vehicle control computer 211. for estimating, approximatmessage planning Based on the vehicle and ing and transmitting to the 984 implement control data list 971 from mission computer a height mission computer, and real time profile z(k), k=1,2,.. data from the position determination system 7, this computer controls the movements of the vehicle and its implements through its proper actuators and 3D, six degrees of freedom position sensors. Based on obstacle messages from the DTM computer determination system 7 it also reacts by e.g. reducing velocity on warning or executing Position emergency stop action in more determination severe cases. computer 73 Vehicle interface 212, electric and Rotating laser-optic hydraulic. sensor 71

Fig 9:

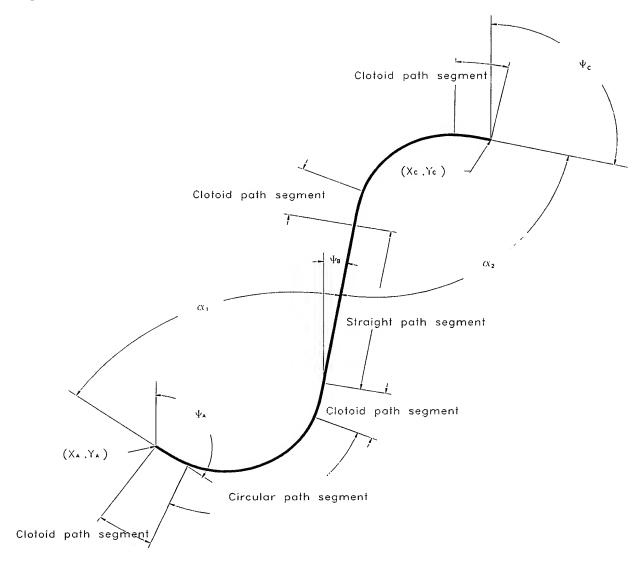


Fig 10:

Flow and exchange of mission instructions and lower level messages, in a reconnaissance and loading task

DTM computer Mission computer Vehicle control Vehicle computer Receive reconnaissance On "ready" message from the Start ==> vehicle control computer: In waiand obstacle detection On radio command: Send reconnaissance and assignment instructions Start engine. Read current ting from the mission computer. obstacle detection assignment posiposition. Send "ready" message to the mission Evaluate criteria for instructions to the DTM tion location within obstacle computer. Simulate computer. reconnaissance path. Generate free or loading zone. vehicle control data list and send On vehicle control data list this list to the vehicle control and Drive Inside reconnaissance from mission computer: zone DTM computers.Go to standby in recon-Start and drive the veh-icle Evaluate criteria for detecattending detection message according to the data list naistion of forward edge of from the DTM computer. and attend path switch sance volume of material message from the mission path On detection message from the computer. On detection of forward DTM computer edge of volume of material Optimize parameters for dynamic On path switch message Send detection message to approach path and determine the and approach path vehicle coordinates of the switch point for the mission computer with and implement control data position of the loading changing from reconnaissance to approach path. Send report point position and the current Continue driving vehicle message to the DTM computer. position, orientation and along the reconnaissance speed of the vehicle. Simulate dynamic approach path. path to the switch point Generate vehicle control data list reconnaissance/approach On report point message and send path switch message path from the mission computer and approach path vehicle and On and past arrival at Evaluate criteria for arrival implement control data list to the Drive vehicle control and DTM to report point. switch point reconndynamic computers.Go to standby in Continuously update the aissance/approach path: apprattending arrival message and terrain model inside Drive vehicle along oach loading profile data list from the loading zone by using path dynamic approach path available measurements DTM computer. from the scanning laser On approach path/loading On loading path message from rangefinder. path switch message and the DTM computer: loading path vehicle and Optimize parameters for loading implement control data list. path and coordinates for switch Continue driving vehicle On arrival to report point on approach path prior to point approach path/loading path along the recon-naissance and send path switch message Drive path to the switch point loading path and vehicle and implement loading Send loading path reconnaiss-ance/approach message with estimated control data list to the vehicle path path approximate loading profile control and DTM computers. and z(k), k=1,2,... in the fixed to control On and past arrival at On "ready" message from vehicle buckground coordinate system switch point to the mission computer. control computer Drive vehicle along loading et path and control vehicle a) Normal "ready"-message. Continue mission with retrun from speed and bucket loading etc. movements according to b) Emergency stop message the received control data Inside obstacle-free zone Break remaining autonomous list functions of mission program and Evaluate criteria for existence of obstacles return initiative to operator On finished loading task: inside obstacle-free zone. station. Send "ready"-message to On warning or emergency mission computer conditions, send corresponding signals to vehicle control computer.

Fig 11:

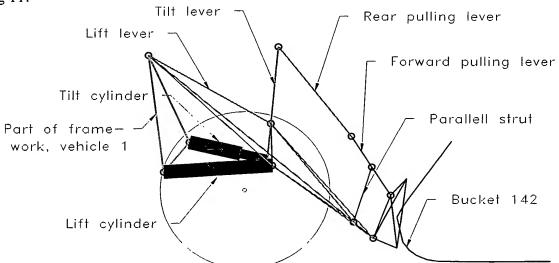


Fig 12:

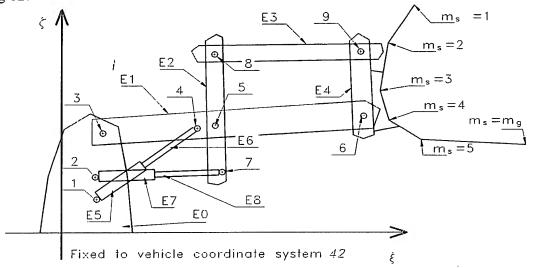
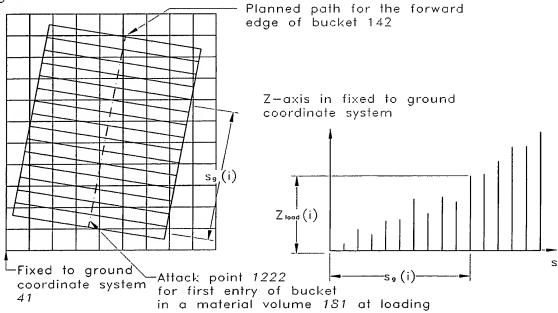


Fig 13:





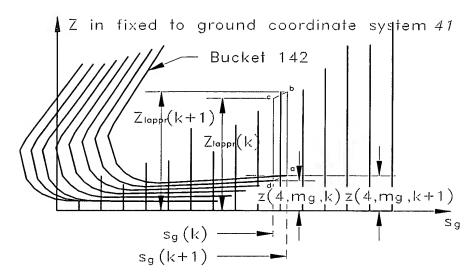


Fig 15:

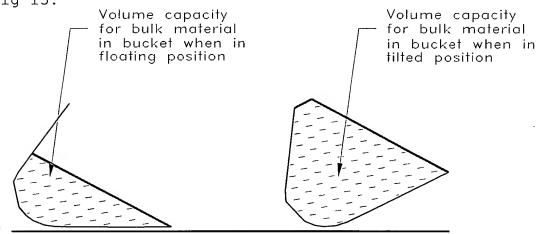


Fig 16:

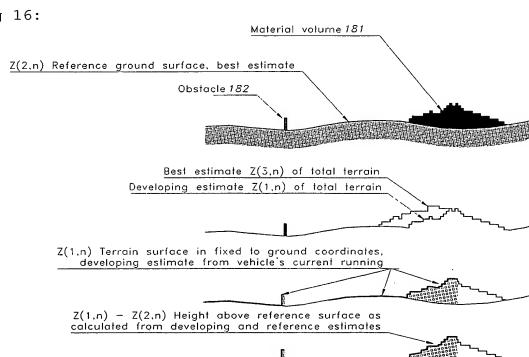


Fig 17:

